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Pressure measurement on Badminton racket

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According to qualitative analyses the activation-relaxation-pattern of the grip forces seems to be a crucial factor of performance in many Badminton techniques. Especially for the backhand net shots it is assumed that experts exert high pressure on the racket handle within a short period of time to utilize the elasticity of the racket whereas athletes on lower level of performance tend to maintain grip forces over a longer period during the final phase of the smash. This is partly supported by EMG analysis [1]. To analyze the movement coordination by the pressure applied on the racket a specific device has been developed.

A specially designed handle bar contains two FSR sensors and an analog amplifier (TLV2460). The FSR sensors (Ø: 18,3 mm/ accuracy: 3-15% within a range of 100 to 10N) were placed at the upper and lower area of the handle bar to allow the player to grip at different positions of the handle bar. Specific pressure points ensure that all pressure applied by the player is transferred to the sensors. The total pressure is then derived by the sum of the pressure measured at each sensor. The measure device is connected via cable and an analog digital converter to a portable data logger, where the data can be stored or transferred via WLan to an external computer [2]. By the integration of the racket device to the mobile system, accelerometic data of the racket and the arm segments can be derived synchronously.

A prototyp of the measure device has been established. First data were taken from an expert (national level), an advanced (regional level) and a recreational player. Grip pressure as well as racket acceleration were measured while subjects performed backhand net shots. The results indicate that experts increase pressure at an early stage to support the forward acceleration of the racket and therefore achieve higher velcities of the racket head. Further research will focus on individual feedback training of elite youth Badminton players

[1] Sakurai, S. & Ohtsuki, T. (2000). Muscle activity and accuracy of performance of the smash stroke in badminton with reference to skill and practise. Journal of Sports Sciences 18, 901-914.

[2] Jaitner, T. & Gawin, W. (submitted) A Mobile Measure Device for the Analysis of Highly Dynamic Movement Techniques.

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